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mental. Hence this book will be available, particularly as a reference book, in many laboratories. The discussion of elementary elastic theory is excellent and not beyond the average undergraduate. More time is evidently given to elasticity by Mr. Searle's students than is usually possible in American colleges and universities for this part of physics. The only criticism that might be made is that several of the experiments given are very complicated for a practical physics course, but these are added experiments so that none of the standard experiments have been crowded out.

A. P. CARMAN

SPECIAL ARTICLES

A NEW GENUS OF CARNIVORES FROM THE MIOCENE OF WESTERN NEBRASKA

WHILE engaged in restudying the material described as *Amphicyon superbus* by the writer in the *Annals of the Carnegie Museum*, Vol. IV., p. 51, it has become apparent that the species, though allied to the European forms, should be regarded as generically distinct from them, and that it is more nearly related to *Daphænus* from the Oligocene of North America. The type specimen consists of a practically complete skeleton, which has been freed from the matrix and is ready for mounting. It is now being restudied and described in detail by the present writer.

For this new genus from the Miocene formation of western Nebraska I propose the name *Daphænodon*. The dentition and cranium show close similarity to *Daphænus* from the Oligocene, and the latter genus apparently represents the ancestral stock from which the proposed genus *Daphænodon* is descended.

DAPHÆNODON, gen. nov.

(Type *Daphænodon superbus* (Peterson), Specimen No. 1589, Car. Mus. Catalog Vert. Foss.)

Principal Generic Characters: Cranium comparatively short, broad, and low; muzzle large, sagittal crest prominent; brain-case small; incisors heavy and short; canines comparatively small and oval in cross-section; P⁴

with antero-internal cusp of moderately large size; M¹ and M² large and broad; M³ present, though small, practically one-rooted and aligned with the internal border of M² and M².

Upon very careful comparison of the type specimen of *Daphænodon superbus* with casts of *Amphicyon giganteus* (*A. major* Blainville) and also with illustrations of the best known European forms¹ it is evident that there are characters of considerable importance, which may be regarded as of generic value. The more important differences may be stated as follows:

The skull of *Amphicyon giganteus* is represented only by the left maxillary, but it indicates a cranium having considerably greater elevation from the alveolar border of the maxillary to the nasals than is the case in *Daphænodon superbus*. It is also seen that the alveolar border is more strongly developed posteriorly in the European genus, M³ being succeeded by a considerable process of the maxillary, while in the American genus the border back of M³ is extremely thin.

In the European form, *A. giganteus*, the canine is of very large size, sharply pointed, has a decided cutting edge posteriorly and a prominent rib on the antero-internal angle, which causes the cross-section of the tooth to be very elliptical, as in certain cats of the Oligocene, while the corresponding tooth in *Daphænodon superbus* is proportionally much smaller, the edges not so sharp in front and behind, and the tooth consequently having a more oval cross-section. The superior premolars in the European genus are proportionally smaller, P⁴ has a distinctly smaller antero-internal tubercle and the long axis of the crown is more nearly antero-posterior, the tooth being placed less obliquely in the jaw than is the case in *Daphænodon superbus*. The superior molars of the latter genus differ in some important particulars, viz.: M¹ is of relatively greater transverse diameter and the posterior intermediate tubercles, especially the one on M², which closes the posterior opening of the median pit in *Amphicyon giganteus*, are absent. M³ of the latter genus

¹ Blainville, Vol. II., Pl. XIV.; Filhol, *Ann. Soc. Geol.*, X., pp. 77-79, Pl. 10-16, 1879.

is of greater functional importance than the corresponding tooth in the American form.

From the illustrations of *Amphicyon lemanensis* by Filhol² it is seen that the occipital condyles of that form are less sessile, the mastoid process is of larger size, and the tympanic bullæ were probably smaller. It is also seen (Pl. XI., figs. 4, 6-8) that M^3 has three roots and the crown is occupied by three distinct cusps, a distinctly more conservative character, and properly to be considered as more primitive than that of the reduced and comparatively simple crowned M^3 of *Daphænodon superbus*. Another character which seems to indicate less specialization in the European genus is the short antero-posterior diameter of M_1 , when compared with that of *Daphænodon superbus*.

It is further seen on comparison that the skull of *Daphænodon superbus* is less elongated than that of *Daphænus felinus* from the American Oligocene. The base of the skull back of the pterygoids is especially shortened. The muzzle is heavier. The incisors are larger, the antero-internal tubercle of P^4 (carnassial) is less developed, M^1 and M^2 are more developed internally, and the postero-internal angles of M_1 and M_2 are more prominent. The position of P^4 is less oblique in the alveolar border than is the case with the corresponding tooth in *Daphænus felinus*, a character tending toward conditions found in the recent dogs.

The limbs of *Daphænodon superbus* are comparatively long and slender, the thoracic region rather light, and the tail is very long. These are characteristic structural features of *Daphænus felinus* described by Mr. Hatcher in the *Memoirs of the Carnegie Museum*, Vol. I., pp. 66-95.

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CARNEGIE MUSEUM,
March 20, 1909

NOTES ON MUSHROOM SPORES

IN making experiments to determine if the spores of dung-inhabiting mucors pass through the stomach and intestines of animals before they germinate, an interesting fact

² L. c., Pl. XIII., Fig. 5.

about the spores of mushrooms was discovered.

Some fresh horse manure, immediately after it was voided, was placed upon a sterilized plate and covered with a sterilized glass cover. On examining parts of this manure for mucor spores, there were found spores resembling mushroom spores. The plate was then set aside for three weeks when an abundant crop of mushrooms appeared. Examination proved them to be *Coprinus ephemerus* Fries.

There is a possibility that the spores might have been floating in the air and might have fallen upon the manure in the short time that it was exposed in the stable but it is not very probable that such was the case.

It seems practically demonstrated that these spores passed through the digestive tract of the horse and escaped any injurious effect from the process of digestion. They germinated and developed into mature plants in a very short time.

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TANKS FOR SOIL INVESTIGATION AT CORNELL UNIVERSITY

THERE are certain experiments involving fundamental problems in soil productiveness that can be conducted only where it is possible to accurately measure the conditions as they exist in the field, and to maintain the records through a great number of years. Some of these problems are as follows:

Effects of the continuous use of large amounts of mineral fertilizers upon the physical and chemical properties of the soil, and upon the bacterial flora and bacterial activity.

Changes that occur in a series of years when soils gradually deteriorate or improve.

Effect of different methods of soil treatment upon the loss of lime in the drainage water.

The loss of potassium and other substances occasioned by manuring with lime.

Loss of soluble salts caused by clean cultivation.

Extent to which soils under field conditions